



Australian Government

Department of Education, Employment and Workplace Relations

PMBPROD247C Hand lay up composites

Revision Number: 1

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Modification History

Not applicable.

Unit Descriptor

Unit descriptor

This competency covers preparation and operations for hand laying up of composite materials to form a simple product and the resolving of routine problems to procedure.

Application of the Unit

Application of this unit

This competency applies to operators who are involved in the production of products by hand lay up of composite materials. This competency is typically performed by operators working either independently or as part of a work team. The operator:

- selects and prepares the materials required to form a product to the required specifications
- sets up moulds
- applies materials as required
- ensures that safety procedures are applied to reduce the risks
- notices any problems and takes required action (eg reporting)
- completes logs and reports as required.

They may record key variables such as mould conditions and production rate and reasons for interruptions.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisites

This unit has **no** prerequisites.

Employability Skills Information

Employability Skills

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT ELEMENT	PERFORMANCE CRITERIA Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1. Check work requirements.	1.1 Identify work requirements from production plan or request. 1.2 Check product, material, and equipment meet requirements for the job(s). 1.3 Recognise requirements which may not be in accordance with usual practice. 1.4 Ask questions of appropriate person to confirm unusual practice. 1.5 Identify hazards associated with the job and take appropriate action. 1.6 Perform other pre-operational checks in accordance with procedures.
2. Set up mould and materials as required.	2.1 Set up mould ready for production. 2.2 Ensure materials are available in the form and quantities required. 2.3 Ensure safety equipment is available and fit for use.
3. Hand lay up composites.	3.1 Apply materials to the mould to specification. 3.2 Monitor product/process quality. 3.3 Make adjustments or seek assistance to remedy faults and non-conformity as required. 3.4 Adjust work to minimise scrap and trim.
4. Respond to routine problems in accordance with procedures.	4.1 Recognise known faults that occur during the operation. 4.2 Identify and take action on causes of routine faults. 4.3 Log problems as required. 4.4 Identify non-routine process and quality problems and take appropriate action.

Required Skills and Knowledge

This describes the essential skills and knowledge and their level required for this unit.

Application of an operational knowledge of the materials, equipment and process sufficient to recognise out of specification products, process problems and materials faults. For example, excess resin will only add weight and weaken the finished product. Therefore care needs to be taken to ensure the correct resin to fibre ratio is used.

Knowledge of organization procedures, relevant regulatory requirements, and the ability to implement them within appropriate time constraints and work standards.

Application of the knowledge of managing risks using the hierarchy of controls applied to the hand lay up process. Application of approved hazard control and safety procedures and the use of PPE in relation to handling materials, equipment operation and cleanup.

Knowledge of and skills in the operation of hand lay up equipment and the main components sufficient for consistent production of quality products including:

- production workflow sequences and materials demand
- accurately monitoring equipment and product quality
- understanding the potential effects of variations in raw materials and equipment in relation to quality of product
- waste management and understanding the importance of reusing non-conforming products wherever possible
- correct selection and use of equipment, materials, processes and procedures
- identify factors which may affect product quality or production output and appropriate remedies.
- setting up moulds
- preparation of resins, including mixing as required
- preparation of fibre reinforcement, including cutting and trimming
- use of composites materials, including gel coats, resins and fibres
- methods of application of composite materials to the mould by hand lay up.

Competence also includes the ability to:

- plan own work, including predicting consequences and identifying improvements
- identify when the operator is able to rectify faults, when assistance is required and who is the appropriate source for assistance
- identify and describe own role and role of others involved directly in the moulding process.

Language, literacy and numeracy requirements

This unit requires the ability to read and interpret typical product specifications, job sheets, procedures, material labels and safety information as provided to operators.

Writing is required to the level of completing workplace forms.

Numeracy is required to the level of reading tables of figures and graphs (and applying the resultant information), using formula percentages/ratios to determine the required mass of an additive (catalyst, pigment etc.) and similar manipulations and interpretation.

Evidence Guide

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment

A holistic approach should be taken to the assessment.

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the Elements, Performance Criteria and skills and knowledge.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

It is essential that competence is demonstrated in the knowledge and skills defined in this unit. These may include the ability to:

- apply the required skills and knowledge to the hand lay up process
- apply approved procedures.

Consistent performance should be demonstrated. For example, look to see that:

- composites production standards are met consistently
- all safety procedures are always followed.

Assessment method and context

Assessment will occur during the hand lay up process for composites and will be undertaken in a work-like environment.

Competence in this unit may be assessed:

- through use of industrial hand lay up composite manufacture, using jobs of appropriate complexity
- in a situation allowing for operation under all normal and a range of abnormal conditions
- by using a suitable simulation and/or a range of case studies/scenarios
- through a combination of these techniques.

In all cases it is expected that practical assessment will be combined with targeted questioning to assess the underpinning knowledge and theoretical assessment will be combined with appropriate practical/simulation or similar assessment. Assessors need to be aware of any cultural issues that may affect responses to questions.

Assessment processes and techniques must be culturally appropriate and appropriate to the oracy, language and literacy capacity of the assessee and the work being performed.

Specific resources for assessment

This section should be read in conjunction with the Range Statement for this unit of competency. Resources required include suitable access to an operating plant or equipment that allows for appropriate and realistic simulation. A bank of case studies/scenarios and questions will also be required to the extent that they form part of the assessment method. Questioning may take place either in the workplace, or in an adjacent, quiet facility such as an office or lunchroom. No other special resources are required.

Access must be provided to appropriate learning and/or assessment support when required. Where applicable, physical resources should include equipment modified for people with disabilities.

Range Statement

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts. Where reference is made to industry codes of practice, and/or Australian/international standards, the latest version must be used.

Context

This competency unit includes the use of equipment and materials to form composite products using hand lay up processes. It includes the operation of all relevant additional equipment where that equipment is integral to the hand lay up process.

Procedures

All operations are performed in accordance with procedures.

Procedures include all relevant workplace procedures, work instructions, temporary instructions and relevant industry and government codes and standards.

Tools and equipment

This competency includes use of equipment and tools such as:

- open moulds for composite products
- hand mixing equipment and stirrers
- knives and cutters to trim fibres
- hand application tools, rollers, brushes, etc
- relevant personal protective equipment.

Hazards

Typical hazards include:

- hazardous materials and vapours
- manual handling hazards
- fire hazards due to flammable nature of resins used
- knife hazards
- glass (and other) fibre hazards (inhalation and skin penetration)
- slip hazards (spilled resin).

Problems

Respond to/rectify 'non-routine problems' means 'apply known solutions to a limited range of predictable problems'. Typical process problems may include:

- cracks, dents or imperfections of the mould
- incorrect resin ratios
- contamination of materials
- shifting of fibres before resin laid
- stacking of fibre and resin sequence problems.

Typical product problems may include:

- voids
- poor surface finish
- colour contamination
- release from mould damage.

Appropriate action for non-routine problems may be reporting to designated person or other action specified in the procedures.

Variables

Key variables to be monitored include:

- ambient temperature
- air flow/ventilation rate
- viscosity of resin
- time since resin mixed vs pot life of mix
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Unit Sector(s)

Not applicable.